



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/086,117	02/26/2002	Christo P. Bojkov	TI-33887	2251
23494	7590	06/04/2004	EXAMINER	
TEXAS INSTRUMENTS INCORPORATED			LEWIS, MONICA	
P O BOX 655474, M/S 3999			ART UNIT	
DALLAS, TX 75265			PAPER NUMBER	
			2822	

DATE MAILED: 06/04/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/086,117	Applicant(s) BOJKOV ET AL	
	Examiner Monica Lewis	Art Unit 2822	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 March 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 19-25 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12 and 19-25 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 14 August 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2822

DETAILED ACTION

1. This office action is in response to the request for continued examination filed March 15, 2004.

Continued Examination Under 37 CFR 1.114

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/15/04 has been entered.

Response to Arguments

3. Applicant's arguments with respect to claims 1-12 and 19-25 have been considered but are moot in view of the new ground(s) of rejection.

Information Disclosure Statement

4. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

Claim Objections

5. Claim 19 is objected to because of the following informalities: a) it appears that "intaegrated" is a spelling error. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claims 19-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. The amendment filed 8/14/03 is objected because it introduces new matter. The new matter which is not supported is as follows: a) copper stud at least a factor of ten thicker than said copper layer. Applicant stated that in the specification "it is clear that the thickness of the copper stud is at least ten times greater than the thickness of the copper layer since the ratio of .3 to .8 is more than one tenth of 10 to 20." However, the specific range of "at least a factor of ten thicker" is not disclosed in the specification. Claims 20-25 depend directly or indirectly from a rejected claim and are, therefore, also rejected under 35 U.S.C. 112, second paragraph for the reasons set above.

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2822

9. Claims 1-3, 9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication*.

In regards to claim 1, Chen et al. ("Chen") discloses the following:

a) a portion of said copper metallization (16) exposed by a window in said overcoat (20) and said window having a perimeter (For Example: See Figure 1p);

b) a patterned copper layer (28) positioned directly on said copper metallization, said metal structure having an electrical conductivity about equal to the electrical conductivity of pure copper, said copper layer overlapping the perimeter of said overcoat window (For Example: See Figure 1p); and

c) a copper stud (32) directly positioned on said copper layer, following the contours of said copper layer (For Example: See Figure 1p).

In regards to claim 1, Chen fails to disclose the following:

a) exposed copper having a clean surface and clean copper metallization.

However, Van Zant discloses having clean surfaces (For Example: See Pages 115-129).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include clean surfaces as disclosed in Van Zant because it aids in removing particles (For Example: See Page 117).

Additionally, since Chen and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Chen.

In regards to claim 2, Chen fails to disclose the following:

a) clean copper surface is free of copper oxide, organic residues, and contamination.

However, Van Zant discloses having clean surfaces (For Example: See Pages 115-129).

It would have been obvious to one having ordinary skill in the art at the time the invention was

Art Unit: 2822

made to modify the semiconductor device of Chen to include clean surfaces as disclosed in Van Zant because it aids in removing particles (For Example: See Page 117).

Additionally, since Chen and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Chen.

In regards to claim 3, Chen discloses the following:

a) direct positioning of said copper layer on said copper pad provides the lowest possible electrical resistance and relinquishes the need for an intermediate barrier or under-bump layer (For Example: See Figure 1p).

In regards to claim 3, Chen fails to disclose the following:

a) clean copper.

However, Van Zant discloses having clean surfaces (For Example: See Pages 115-129). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include clean surfaces as disclosed in Van Zant because it aids in removing particles (For Example: See Page 117).

Additionally, since Chen and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Chen.

In regards to claim 9, Chen discloses the following:

a) copper layer follows the contour of said perimeter of said overcoat window (For Example: See Figure 1p).

In regards to claim 11, Chen discloses the following:

a) a portion of said copper metallization exposed by a window in said overcoat (For Example: See Figure 1p);

b) a copper layer positioned directly on said clean copper metallization, said metal structure having an electrical conductivity about equal to the conductivity of pure copper, said layer overlapping the perimeter of said overcoat window (For Example: See Figure 1p); and

c) a copper stud positioned directly on said copper layer, and one of said solder bumps bonded to said copper stud (For Example: See Figure 1p).

In regards to claim 11, Chen fails to disclose the following:

a) exposed copper having a clean surface and clean copper metallization.

However, Van Zant discloses having clean surfaces (For Example: See Pages 115-129).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include clean surfaces as disclosed in Van Zant because it aids in removing particles (For Example: See Page 117).

Additionally, since Chen and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Chen.

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication* and Kondo et al. (U.S. Patent No. 5,656,858).

In regards to claim 4, Chen fails to disclose the following:

a) copper layer has a thickness in the range from about .3 to .8 μm .

However, Kondo et al. ("Kondo") discloses a copper layer that has a thickness in the range from .3 to .8 μm (For Example: See Column 7 Lines 52 and 53). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include a copper layer that has a thickness in the range from .3 to .8 μm as disclosed in Kondo because it aids with adhesiveness (For Example: See Column 2 Lines 38-41).

Additionally, since Chen and Kondo are both from the same field of endeavor, the purpose disclosed by Kondo would have been recognized in the pertinent art of Chen.

Finally, the applicant has not established the critical nature of the dimension of a copper layer that “has a thickness in the range from about .3 to .8 μm .” “The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication* and Edelstein et al. (U.S. Patent No. 6,133,136).

In regards to claim 5, Chen fails to disclose the following:

a) overcoat is a moisture-impermeable inorganic layer including silicon nitride and silicon oxynitride of approximately 1.0 μm thickness.

However, Edelstein et al. (“Edelstein”) discloses the use of an overcoat including silicon nitride and silicon oxynitride of approximately 1.0 μm thickness (For Example: See Column 2 Lines 40-47). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of an overcoat including silicon nitride and silicon oxynitride of approximately 1.0 μm thickness as disclosed in Edelstein because it aids in improving the structural integrity of the device (For Example: See Column 1 Lines 1-63).

Additionally, since Chen and Edelstein are both from the same field of endeavor, the purpose disclosed by Edelstein would have been recognized in the pertinent art of Chen.

Finally, the applicant has not established the critical nature of the dimension of “a overcoat including silicon nitride and silicon oxynitride of approximately 1.0 μm thickness.”

“The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication*, Edelstein et al. (U.S. Patent No. 6,133,136) and Kondo et al. (U.S. Patent No. 5,656,858).

In regards to claim 6, Chen discloses the following:

a) inorganic layer forms a perimeter around said window coverable by said copper layer (For Example: See Figure 1p).

In regards to claim 6, Chen fails to disclose the following:

a) a slope.

However, Kondo et al. (“Kondo”) discloses the use of a window having a slope coverable by said copper layer (For Example: See Figure 7e). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of a window having a slope coverable by said copper layer as disclosed in Kondo because it aids in improving the adhesiveness of the device (For Example: See Column 2 Lines 38-41).

Additionally, since Chen and Kondo are both from the same field of endeavor, the purpose disclosed by Kondo would have been recognized in the pertinent art of Chen.

13. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication*, Applicant's Prior Art and Gansauge et al. (U.S. Patent No. 5,010,389).

In regards to claim 7, Chen fails to disclose the following:

a) overcoat is a sequence of an inorganic layer adjacent to the integrated circuit, overlaid by a polymeric layer including polyimide, benzocyclobutene, and polybenzoxazole.

However, Applicant's Prior Art discloses the use of a polymeric layer (For Example: See Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of a polymeric layer as disclosed in Applicant's Prior Art because it aids in reducing stress (For Example: See Page 3 Lines 14-30).

Additionally, since Chen and Applicant's Prior Art are both from the same field of endeavor, the purpose disclosed by Applicant's Prior Art would have been recognized in the pertinent art of Chen.

b) polymeric layer of approximately 3.0 to 10 um thickness.

However, Gansauge et al. ("Gansauge") discloses the use of a polymeric layer that is approximately 3.0 to 10 um thick (For Example: See Column 5 Lines 18-20). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of a polymeric layer that is approximately 3.0 to 10 um thick as disclosed in Gansauge because it aids in improving the packaging of the device (For Example: See Abstract).

Additionally, since Chen and Gansauge are both from the same field of endeavor, the purpose disclosed by Gansauge would have been recognized in the pertinent art of Chen.

Finally, the applicant has not established the critical nature of the dimension of “polymeric layer of approximately 3.0 to 10 um thickness.” “The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

14. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication*, Applicant’s Prior Art, Gansauge et al. (U.S. Patent No. 5,010,389) and Kondo et al. (U.S. Patent No. 5,656,858).

In regards to claim 8, Chen fails to disclose the following:

a) sequence of layers forms a perimeter around said window having a slope coverable by said copper layer.

However, Kondo discloses the use of a window having a slope coverable by said copper layer (For Example: See Figure 7e). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of a window having a slope coverable by said copper layer as disclosed in Kondo because it aids in improving the adhesiveness of the device (For Example: See Column 2 Lines 38-41).

Additionally, since Chen and Kondo are both from the same field of endeavor, the purpose disclosed by Kondo would have been recognized in the pertinent art of Chen.

Art Unit: 2822

15. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication* and Kondo et al. (U.S. Patent No. 5,656,858).

In regards to claim 10, Chen fails to disclose the following:

a) copper stud has a thickness in the range from about 10 to 20 um and a width equal to the extent of said copper layer, following the contour of said perimeter of said overcoat window (For Example: See Figure 7e and Column 7 Lines 53 and 54).

However, Kondo discloses the use of a copper stud that has a thickness in the range from about 10 to 20 um and a width equal to the extent of said copper layer, following the contour of said perimeter of said overcoat window (For Example: See Figure 7e and Column 7 Lines 53 and 54). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of a copper stud that has a thickness in the range from about 10 to 20 um and a width equal to the extent of said copper layer, following the contour of said perimeter of said overcoat window as disclosed in Kondo because it aids in improving the adhesiveness of the device (For Example: See Column 2 Lines 38-41).

Additionally, since Chen and Kondo are both from the same field of endeavor, the purpose disclosed by Kondo would have been recognized in the pertinent art of Chen.

Finally, the applicant has not established the critical nature of the dimension of "a copper stud that has a thickness of 10 to 20 um." "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by

showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

16. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication* and Huang (U.S. Publication No. 2002/0096764).

In regards to claim 12, Chen fails to disclose the following:

a) solder bumps are selected from a group consisting of tin, indium, tin/lead, tin/indium, tin/silver, tin/bismuth, conductive adhesives, and z-axis conductive materials.

However, Huang discloses the use of tin/lead solder bumps (For Example: See Paragraph 23). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of an tin/lead solder bumps as disclosed in Huang because it aids in providing a lower melting point solder (For Example: See Paragraph 23).

Additionally, since Chen and Huang are both from the same field of endeavor, the purpose disclosed by Huang would have been recognized in the pertinent art of Chen.

17. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication* and Lee et al. (U.S. Publication No. 2002/0121692).

In regards to claim 19, Chen discloses the following:

a) a portion of said copper metallization exposed by a window in said overcoat (For Example: See Figure 1p);

b) a copper layer positioned directly on said exposed copper metallization, said layer overlapping the perimeter of said overcoat window (For Example: See Figure 1p); and

c) a copper stud positioned on said copper layer, and following the contours of said copper layer (For Example: See Figure 1p).

In regards to claim 19, Chen fails to disclose the following:

a) patterned copper layer and clean copper metallization.

However, Van Zant discloses having clean surfaces (For Example: See Pages 115-129). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include clean surfaces as disclosed in Van Zant because it aids in removing particles (For Example: See Page 117).

Additionally, since Chen and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Chen.

b) copper stud at least a factor of ten thicker than said copper layer.

However, Lee et al. ("Lee") discloses a copper stud that is at least ten times thicker than the copper layer (For Example: See Paragraph 89 and Paragraph 93). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include a copper stud that is at least ten times thicker than the copper layer as disclosed in Lee because it aids in providing a reliable fine pitch solder bump at low cost (For Example: See Paragraph 2).

Additionally, since Chen and Lee are both from the same field of endeavor, the purpose disclosed by Lee would have been recognized in the pertinent art of Chen.

Finally, the applicant has not established the critical nature of the dimension of "copper stud at least a factor of ten thicker than said copper layer." "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular

Art Unit: 2822

range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

18. Claims 20, 22 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication*, Lee et al. (U.S. Publication No. 2002/0121692 and Kondo et al. (U.S. Patent No. 5,656,858).

In regards to claim 20, Chen fails to disclose the following:

a) copper layer has a thickness in the range from about .3 to .8 μm .

However, Kondo discloses a copper layer that has a thickness in the range from .3 to .8 μm (For Example: See Column 7 Lines 52 and 53). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include a copper layer that has a thickness in the range from .3 to .8 μm as disclosed in Van Zant because it aids with adhesiveness (For Example: See Column 2 Lines 38-41).

Additionally, since Chen and Kondo are both from the same field of endeavor, the purpose disclosed by Kondo would have been recognized in the pertinent art of Chen.

Finally, the applicant has not established the critical nature of the dimension of a copper layer that “has a thickness in the range from about .3 to .8 μm ” “The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

In regards to claim 22, Chen fails to disclose the following:

a) window in said overcoat has sloped sides.

Art Unit: 2822

However, Kondo discloses the use of a window having sloped sides (For Example: See Figure 7e). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of a window having a sloped sides as disclosed in Kondo because it aids in improving the adhesiveness of the device (For Example: See Column 2 Lines 38-41).

Additionally, since Chen and Kondo are both from the same field of endeavor, the purpose disclosed by Kondo would have been recognized in the pertinent art of Chen.

In regards to claim 25, Chen fails to disclose the following:

a) copper stud has a thickness in the range from about 10 to 20 um and a width equal to the extent of said copper layer, following the contour of said perimeter of said overcoat window.

However, Kondo discloses the use of a copper stud that has a thickness in the range from about 10 to 20 um and a width equal to the extent of said copper layer, following the contour of said perimeter of said overcoat window (For Example: See Figure 7e and Column 7 Lines 53 and 54). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of a copper stud that has a thickness in the range from about 10 to 20 um and a width equal to the extent of said copper layer, following the contour of said perimeter of said overcoat window as disclosed in Kondo because it aids in improving the adhesiveness of the device (For Example: See Column 2 Lines 38-41).

Additionally, since Chen and Kondo are both from the same field of endeavor, the purpose disclosed by Kondo would have been recognized in the pertinent art of Chen.

Finally, the applicant has not established the critical nature of the dimension of “a copper stud that has a thickness of 10 to 20 um” “The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range.” *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir.1990).

19. Claims 21 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication*, Lee et al. (U.S. Publication No. 2002/0121692 and Edelstein et al. (U.S. Patent No. 6,133,136.

In regards to claim 21, Chen discloses the following:

a) overcoat is a layer of silicon nitride.

However, Edelstein discloses the use of an overcoat including silicon nitride (For Example: See Column 2 Lines 40-47). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Chen to include the use of an overcoat including silicon nitride as disclosed in Edelstein because it aids in improving the structural integrity of the device (For Example: See Column 1 Lines 1-63).

Additionally, since Chen and Edelstein are both from the same field of endeavor, the purpose disclosed by Edelstein would have been recognized in the pertinent art of Chen.

In regards to claim 24, Chen discloses the following:

a) copper layer follows the contour of said perimeter of said overcoat window (For Example: See Figure 1p).

Art Unit: 2822

20. Claim 23 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al. (U.S. Publication No. 2003/0013291) in view of Van Zant *Microchip Fabrication*, Lee et al. (U.S. Publication No. 2002/0121692 and Applicant's Prior Art.

In regards to claim 23, Chen fails to disclose the following:

a) overcoat is a sequence of an inorganic layer adjacent to the integrated circuit overlaid by a polymeric layer.

However, Applicant's Prior Art discloses the use of a polymeric layer (For Example: See Figure 2). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor device of Kondo to include the use of a polymeric layer as disclosed in Applicant's Prior Art because it aids in reducing stress (For Example: See Page 3 Lines 14-30).

Additionally, since Kondo and Applicant's Prior Art are both from the same field of endeavor, the purpose disclosed by Applicant's Prior Art would have been recognized in the pertinent art of Kondo.

Conclusion

21. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on 571-272-1852. The fax phone number for the organization where this application or proceeding is assigned is 703-308-7722 for regular and after final

Art Unit: 2822

communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML
May 25, 2004

A handwritten signature in black ink, appearing to be 'Mary Wilczewski', written over a horizontal dotted line.

Mary Wilczewski
Primary Examiner